ANTIBACTERIAL CLEANING WIPE

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Field of Invention

The present invention relates to a nonwoven fabric which has been impregnated with an antibacterial liquid cleaning composition.

Background of the Invention

The patent literature describes numerous wipes for both body cleaning and cleaning of hard surfaces but none describe the instant cleaning wipes which have improved cleaning characteristics in the minimization of streaking and residue.

U.S. Patent Nos. 5,756,612; 5,763,332; 5,908,707; 5,914,177; 5,980,922 and 6,168,852 teach cleaning compositions which are inverse emulsions.

U.S. Patent Nos. 6,183,315 and 6,183,763 teach cleaning compositions containing a proton donating agent and having an acidic pH.

U.S. Patent Nos. 5,863,663; 5,952,043; 6,063,746 and 6,121,165 teaches cleaning compositions which are out in water emulsions.

U.S. Patent No. 6,495,508; 6,346,506; 6,429,183 and 6,429,182 all teach antibacterial cleaning wipes containing a zwitterionic surfactant which is excluded from the instant compositions.

U.S. Patent No. 6,410,499 teaches an antibacterial wipe containing an anionic surfactant which is excluded from the instant compositions.

U.S. Patent No. 6,436,892 teaches an antibacterial cleaning wipe which contains 2bromo-2nitropropane-1,3,diol which is excluded from the instant composition.

Summary of the Invention

An antibacterial cleaning wipe for cleaning hard surfaces such as walls, counter tops and floors comprises a nonwoven fabric containing at least polyester fibers and viscose fibers, wherein is the nonwoven fabric is impregnated with a liquid cleaning composition containing at least one nonionic surfactant, a disinfecting agent, a cosurfactant, an alkanol, and water, wherein the liquid cleaning composition is not an emulsion and does not contain a zwitterionic surfactant, an anionic surfactant or

2bromo-2nitropropane-1,3,diol, proteins, metallic salts, enzymes, amides, sodium hypochlorite, dimethicone, N-methyl-2-pyrrolidone, monoalkyl phosphate or silicon based sulfosuccinate.

Detailed Description of the Invention

The present invention relates to an antibacterial cleaning wipe for hard surfaces which comprises approximately:

(a) 15 wt. % to 35 wt. % of a non-woven fabric which consists of at least polyester fibers and viscose fibers and preferably consists of 60 wt. % to 95 wt. % of wood pulp fibers, 2.5 wt. % to 20 wt. % of viscose fibers and 2.5 wt. % to 20 wt. % of polyester fibers or 15 wt. % to 35 wt. % of a non-woven fabric which consists of 70 wt. % to 90 wt. % of wood pulp fibers and 5 wt. % to 30 wt. % of a chemical binder or 15 wt. % to 35 wt. % of a non-woven fabric which consists of 40 wt. % to 60 wt. % of wood pulp fibers, 10 wt. % to 30 wt. % of polyester fibers, 10 wt. % to 30 wt. % of polypropylene fibers and 1 wt. % to 20 wt. % of a chemical binder ; and

(b) 65 wt. % to 85 wt. % of a liquid cleaning composition being impregnated in said nonwoven fabric, wherein said liquid cleaning composition comprises:

(i) 0.5 wt. % to 10 wt. % of at least one ethoxylated nonionic surfactant;

(ii) 0.25 wt. % to 10 wt. %, more preferably 0.5 wt. % to 6 wt. % of a C_1-C_4 alkanol;

(iii) 0.5 wt. % to 8 wt. %, more preferably 1 wt. % to 5 wt. % of a cosurfactant;

(iv) 0.1 wt. % to 2 wt. %, more preferably 0.2 wt. % to 1.4 wt. % of a disinfecting agent;

(vi) 0 to 1.0 wt. %, more preferably 0.1 wt. % to 0.8 wt. % of a perfume; and

(vii) the balance being water, wherein the composition has a pH of about 5 to about 8.

As used herein and in the appended claims the term "perfume" is used in its ordinary sense to refer to and include any non-water soluble fragrant substance or mixture of substances including natural (i.e., obtained by extraction of flower, herb, blossom or plant), artificial (i.e., mixture of natural oils or oil constituents) and synthetically produced substance) odoriferous substances. Typically, perfumes are complex mixtures of blends of various organic compounds such as alcohols, aldehydes, ethers, aromatic compounds and varying amounts of essential oils (e.g., terpenes) such as from 0% to 80%, usually from 10% to 70% by weight, the essential oils themselves being volatile odoriferous compounds and also serving to dissolve the other components of the perfume.

In the present invention the precise composition of the perfume is of no particular consequence to cleaning performance so long as it meets the criteria of water immiscibility and having a pleasing odor. Naturally, of course, especially for cleaning compositions intended for use in the home, the perfume, as well as all other ingredients, should be cosmetically acceptable, i.e., non-toxic, hypoallergenic, etc.. The instant compositions show a marked improvement in ecotoxocity as compared to existing commercial products.

The water soluble nonionic surfactants utilized in this invention are commercially well known and include the primary aliphatic alcohol ethoxylates, secondary aliphatic alcohol ethoxylates, alkylphenol ethoxylates and ethylene-oxide-propylene oxide condensates on primary alkanols, such a Plurafacs (BASF) and condensates of ethylene oxide with sorbitan fatty acid esters such as the Tweens (ICI). The nonionic synthetic organic detergents generally are the condensation products of an organic aliphatic or alkyl aromatic hydrophobic compound and hydrophilic ethylene oxide groups. Practically any hydrophobic compound having a carboxy, hydroxy, amido, or amino group with a free hydrogen attached to the nitrogen can be condensed with ethylene oxide or with the polyhydration product thereof, polyethylene glycol, to form a water-soluble nonionic detergent. Further, the length of the polyethenoxy chain can be

adjusted to achieve the desired balance between the hydrophobic and hydrophilic elements.

The nonionic surfactant class includes the condensation products of a higher alcohol (e.g., an alkanol containing about 8 to 18 carbon atoms in a straight or branched chain configuration) condensed with about 5 to 30 moles of ethylene oxide, for example, lauryl or myristyl alcohol condensed with about 16 moles of ethylene oxide (EO), tridecanol condensed with about 6 to moles of EO, myristyl alcohol condensed with about 10 moles of EO per mole of myristyl alcohol, the condensation product of EO with a cut of coconut fatty alcohol containing a mixture of fatty alcohols with alkyl chains varying from 10 to about 14 carbon atoms in length and wherein the condensate contains either about 6 moles of EO per mole of total alcohol or about 9 moles of EO per mole of alcohol and tallow alcohol ethoxylates containing 6 EO to 11 EO per mole of alcohol.

A preferred group of the foregoing nonionic surfactants are the Neodol ethoxylates (Shell Co.), which are higher aliphatic, primary alcohol containing about 9-15 carbon atoms, such as C_9-C_{11} alkanol condensed with 2.5 to 10 moles of ethylene oxide (NEODOL 91-2.5 or -5 or -6 or -8), C_{12-13} alkanol condensed with 6.5 moles ethylene oxide (Neodol 23-6.5), C_{12-15} alkanol condensed with 12 moles ethylene oxide (Neodol 25-12), C_{14-15} alkanol condensed with 13 moles ethylene oxide (Neodol 45-13), and the like.

An especially preferred nonionic system comprises the mixture of a nonionic surfactant formed from a C_9-C_{11} alkanol condensed with 2 to 3.5 moles of ethylene oxide (C_{9-11} alcohol EO 2 to 3.5:1) with a nonionic surfactant formed from a C_9-C_{11} alkanol condensed with 7 to 9 moles of ethylene oxide (C_9-C_{11} alcohol EO 7 to 9:1), wherein the weight ratio of the C_9-C_{11} alcohol EO 7 to 9:1 to the C_9-C_{11} alcohol EO 2 to 3.5:1 is from 8:1 to 1:1 from preferably 6:1 to 3:1.

Additional satisfactory water soluble alcohol ethylene oxide condensates are the condensation products of a secondary aliphatic alcohol containing 8 to 18 carbon atoms in a straight or branched chain configuration condensed with 5 to 30 moles of ethylene

oxide. Examples of commercially available nonionic detergents of the foregoing type are C_{11}-C_{15} secondary alkanol condensed with either 9 EO (Tergitol 15-S-9) or 12 EO (Tergitol 15-S-12) marketed by Union Carbide.

Other suitable nonionic surfactants include the polyethylene oxide condensates of one mole of alkyl phenol containing from about 8 to 18 carbon atoms in a straight- or branched chain alkyl group with about 5 to 30 moles of ethylene oxide. Specific examples of alkyl phenol ethoxylates include nonyl phenol condensed with about 9.5 moles of EO per mole of nonyl phenol, dinonyl phenol condensed with about 12 moles of EO per mole of phenol, dinonyl phenol condensed with about 15 moles of EO per mole of phenol and di-isoctylphenol condensed with about 15 moles of EO per mole of phenol. Commercially available nonionic surfactants of this type include Igepal CO-630 (nonyl phenol ethoxylate) marketed by GAF Corporation.

Also among the satisfactory nonionic surfactants are the water-soluble condensation products of a C_8-C_{20} alkanol with a heteric mixture of ethylene oxide and propylene oxide wherein the weight ratio of ethylene oxide to propylene oxide is from 2.5:1 to 4:1, preferably 2.8:1 to 3.3:1, with the total of the ethylene oxide and propylene oxide (including the terminal ethanol or propanol group) being from 60-85%, preferably 70-80%, by weight. Such detergents are commercially available from BASF-Wyandotte and a particularly preferred detergent is a C_{10}-C_{16} alkanol condensate with ethylene oxide and propylene oxide, the weight ratio of ethylene oxide to propylene oxide being 3:1 and the total alkoxy content being about 75% by weight.

Other suitable water-soluble nonionic surfactants are marketed under the trade name "Pluronics". The compounds are formed by condensing ethylene oxide with a hydrophobic base formed by the condensation of propylene oxide with propylene glycol. The molecular weight of the hydrophobic portion of the molecule is of the order of 950 to 4000 and preferably 200 to 2,500. The addition of polyoxyethylene radicals to the hydrophobic portion tends to increase the solubility of the molecule as a whole so as to make the surfactant water-soluble. The molecular weight of the block polymers varies from 1,000 to 15,000 and the polyethylene oxide content may comprise 20% to 80% by

weight. Preferably, these surfactants will be in liquid form and satisfactory surfactants are available as grades L 62 and L 64.

The disinfectant agent which is used in the instant composition is selected from the group consisting of C_8-C_{16} alkyl amines, C_8-C_{16} alkyl benzyl dimethyl ammonium chlorides, C_8-C_{16} dialkyl dimethyl ammonium chlorides, C_8-C_{16} alkyl, C_8-C_{14} alkyl dimethyl ammonium chloride and chlorhexidine and mixtures thereof.

Some typical disinfectant agent useful in the instant compositions are tetraalkyl or trialkyl benzyl ammonium salts which are manufactured by Lonza, S.A. They are: Bardac 2180 (or 2170) which is N-decyl-N-isononyl-N, N-dimethyl ammonium chloride; Bardac 22 which is didecyl dimethyl ammonium chloride; Bardac LF which is N,Ndioctyl-N, N-dimethyl ammonium chloride; Bardac 114 which is a mixture in a ratio of 1:1:1 of N-didecyl-N, N-dimethyl ammonium chloride/N-alkyl-N-ethyl phenylmethyl-N, N-dimethyl-N-ethyl ammonium chloride; and Barquat MB-50 which is N-alkyl-N, N-dimethyl-N-benzyl ammonium chloride.

The cosurfactants which are used in the instant compositions are selected from the group consisting of polypropylene glycol of the formula $HO(CH_3CHCH_2O)_nH$ wherein n is a number from 1 to 18, and mono and di C_1-C_6 alkyl ethers and esters of ethylene glycol and propylene glycol having the structural formulas $R(X)_nOH$, $R_1(X)_nOH$, $R(X)_nOR$ and $R_1(X)_nOR_1$wherein R is C_1-C_6 alkyl group, R_1 is C_2-C_4 acyl group, X is (OCH_2CH_2) or $(OCH_2(CH_3)CH)$ and n is a number from 1 to 4, diethylene glycol, triethylene glycol, an alkyl lactate, wherein the alkyl group has 1 to 6 carbon atoms, 1methoxy-2-propanol, 1methoxy-3-propanol, and 1methoxy 2-, 3- or 4-butanol.

Representative members of the polypropylene glycol include dipropylene glycol and polypropylene glycol having a molecular weight of 150 to 1000, e.g., polypropylene glycol 400. Satisfactory glycol ethers are ethylene glycol monobutyl ether (butyl cellosolve), diethylene glycol monobutyl ether (butyl carbitol), triethylene glycol monobutyl ether, mono, di, tri propylene glycol monobutyl ether, tetraethylene glycol monobutyl ether, mono, di, tripropylene glycol monomethyl ether, propylene glycol

monomethyl ether, ethylene glycol monohexyl ether, diethylene glycol monohexyl ether, propylene glycol tertiary butyl ether, ethylene glycol monoethyl ether, ethylene glycol monomethyl ether, ethylene glycol monopropyl ether, ethylene glycol monopentyl ether, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, diethylene glycol monopropyl ether, diethylene glycol monopentyl ether, triethylene glycol monomethyl ether, triethylene glycol monoethyl ether, triethylene glycol monopropyl ether, triethylene glycol monopentyl ether, triethylene glycol monohexyl ether, mono, di, tripropylene glycol monoethyl ether, mono, di tripropylene glycol monopropyl ether, mono, di, tripropylene glycol monopentyl ether, mono, di, tripropylene glycol monohexyl ether, mono, di, tributylene glycol mono methyl ether, mono, di, tributylene glycol monoethyl ether, mono, di, tributylene glycol monopropyl ether, mono, di, tributylene glycol monobutyl ether, mono, di, tributylene glycol monopentyl ether and mono, di, tributylene glycol monohexyl ether, ethylene glycol monoacetate and dipropylene glycol propionate. While all of the aforementioned glycol ether compounds provide the described stability, the most preferred cosurfactant is propylene glycol N-butyl ether.

The preferred C_1-C_4 alkanols are ethanol or isopropanol and mixtures thereof.

The final essential ingredient in the instant composition is water. The proportion of water in the compositions generally is in the range of 70 wt. % to 98.5 wt. %.

Acids that can be used in the instant composition at a concentration of 0 to 3 wt. %, more preferably 0.05 wt. % to 3 wt. % are selected from the group consisting of organic acids and inorganic acids and mixtures thereof. The organic acids are selected from the group consisting of mono- and di-aliphatic carboxylic acids and hydroxy containing organic acids and mixtures thereof. Typical organic acids are adipic acid, succinic acid, lactic acid, glycolic acid, salicylic acid, tartaric acid and ortho hydroxy benzoic acid. Typical inorganic acids are sulfuric acid, nitric acid and hydrochloric acid.

The cleaning composition of this invention may, if desired, also contain other components either to provide additional effect or to make the product more attractive to the consumer. The following are mentioned by way of example: Colors or dyes in amounts up to 0.5% by weight; preservatives or antioxidizing agents, such as iodo

propynyl butyl carbamate, formalin, 5-chloro-2-methyl-4-isothaliazolin-3-one, 2,6-di-tert.butyl-p-cresol, etc., in amounts up to 2% by weight; and pH adjusting agents, such as sulfuric acid, citric acid or sodium hydroxide, mono-, di- and tri-alkanol amines as needed.

The cleaning compositions are prepared by simple batch mixing at 25°C-30°C. The nonwoven fabric is impregnated with the liquid cleaning composition by means of a positive impregnation process. The liquid is positively fed into the nonwoven fabric through a controlled gear pump and injection bar at a ratio of about 2.5 to 4 grams of liquid cleaning composition to about 1 gram of the nonwoven fabric.

The non-woven fabric is formed from 10 wt. % to 90 wt. % of viscose fibers and 10 wt. % to 90 wt. % of polyester fibers such as Spunlace. More preferably the non-woven fabric comprises 10 wt. % to 95 wt. % of wood pulp fibers, 1 wt. % to 40 wt. % of viscose fibers and 1 wt. % to 40 wt. % of polyester fibers. Such a non-woven fabric which is manufactured by Ahlstrom under the name Hydraspun comprises about 60% to 95% of wood pulp fibers, 2.5 wt. % to 20 wt. % of viscose fibers and 2.5 wt. % to 20 wt. % of polyester fibers. Another example within the scope of this invention is a non-woven formed from 70 wt. % to 90 wt. % of wood pulp and 5 wt. % to 30 wt. % of a chemical binder made by the Airlaid process. Typical examples of chemical binders are ethylene vinyl acetate polymer (EVA) and styrene butadiene copolymer. Still another example within the scope of this invention is a double sided non-woven formed by a smooth and a scrubby side. Such a non-woven comprises about 10 wt. % to 90 wt. of wood pulp fibers, 1 wt. % to 50 wt. % of polyester fibers, 1 wt. % to 50 wt. % of polypropylene fibers and 1 wt. % to 40 wt. % of a chemical binder. More preferably this non-woven fabric comprises 40 wt. % to 60 wt. % of wood pulp fibers, 10 wt. % to 30 wt. % of polyester fibers, 10 wt. % to 30 wt. % of polypropylene fibers and 1 wt. % to 20 wt. % of a chemical binder.

The following examples illustrate liquid cleaning compositions of the described invention. The exemplified compositions are illustrative only and do not limit the scope

of the invention. Unless otherwise specified, the proportions in the examples and elsewhere in the specification are by weight.

Example 1

The following cleaning wipes were made by the aforementioned process.

	A	B
Part I	Wt. %	Wt. %
Propylene glycol N-butyl ether	1.0	1.0
Ethanol	2.0	2.0
C9-C11 alcohol EO7.5-8:1 nonionic	1.25	1.5
Perfume	0.55	0.55
C9-C11 alcohol EO2.5:1 nonionic	0.25	0.25
Didecyl dimethyl ammonium chloride	1.0	1.0
Water	63.85	63.60
Part II		
Part I	76.19	76.19
Hydraspun 8582	23.81	23.81

Shine performance

Formula A was tested for shine performance on Perspex tiles and rated on a 9 point scale (1 = very poor/much residues and 9 = very good/no residues).

	A
Shine score	6

Cleaning performance

Formula A was rated for degreasing performance as follows: The degreasing effectiveness is measured using a Gardner straight-line washability machine (5% tallow soil, 10 strokes). The cleaning performance is assessed by the % of soil removed.

	A
Degreasing performance	84%